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Analysis of the impact of oil prices on trade openness in Nigeria: Further evidence from the ARDL bound test approach.

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Abstract

This paper focused on investigating the impact of oil prices on trade openness in Nigeria. Secondary data were collected from World Development Indicator, International Monetary Fund and Central Bank of Nigeria (CBN) Statistical Bulletins and used for the study between1980-2020 to analyze the impact of crude oil prices on stock prices in Nigeria 1980-2020 and the impact of oil price on exchange rate in Nigeria 1980-2020. The method of estimation used in this study is Autoregressive Distribution Lag (ARDL) and the ARDL bounds test shows the existence of co-integration in model. Oil price has shown positive impact on trade openness in both short run and long run in this research. This study recommends that Stock market regulatory agencies should take steps that would allow and encourage oil and gas companies to participate fully in the market so that oil and gas companies can have more direct impact on the Nigerian economy. Transparency and accountability in the stock exchange market should also be giving by regulators so as to boost the confidence of investors in the market. Diversification policy should be ensured by the government to minimize overreliance of the economy on oil in order to reduce the negative effects of oil shocks on the economy. This should be done with proper planning, implementation and firm control of some macroeconomic variables like exchange rate, inflation, trade openness and so on to encourage manufacturers boost productivity and fast track growth.

Keywords: Economic Policy, Oil Prices, Trade Openness.

1. Introduction

Trade is one of oldest business in the globe even in the contemporary world; trade also plays a major role in increasing the economic activities by creating job opportunities and finally leads to economic growth and economic development. Oil resources transactions are the most traded commodities in the world as such, fluctuations in oil prices will explain the trade changes.

Trade openness was discussed by diverse of scholars (Nowbutsing 2014, and Zarra-Nezhad, Hosseinpour and Arman 2014, Keho, 2017) due to its influence on economic growth of both developing and developed countries. The discussion was on whether trade openness is significant in the short run or long run on the development of respective countries. The major objective is for mutual economic benefit. Trade openness has promoted movement of goods and services from developing to developed countries and improves the advancement in technology. The world economies are recently benefiting from trade openness due to the diffusion and absorption of technology.

The trends of oil prices and trade openness from 1980-2020 in Nigeria are presented in figure 1.2

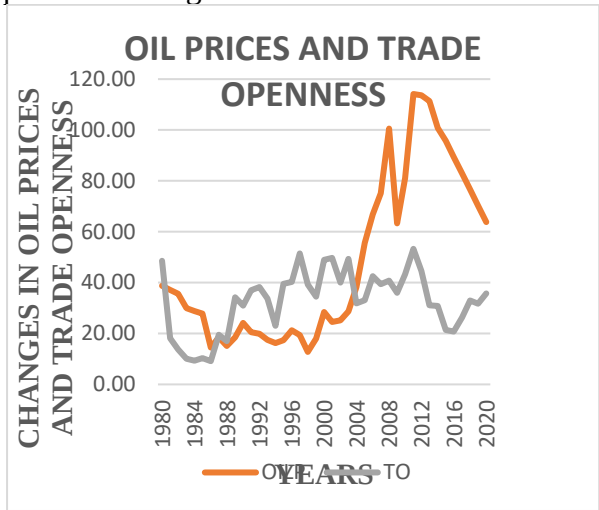

Figure 1: Oil prices and trade openness from 1980-2020 in Nigeria

The diagram of oil prices and stock prices showed the trends of the two variables which are oil prices and stock prices at different periods. The trends of the graph indicated that increase in oil prices is accompanied by the corresponding increase in the value of stock prices in some specific periods. Looking at these statistics at different time period and the behavior of the graph of oil prices and stock prices, there is an issue about the correlation between oil prices and stock prices.

Some researchers concluded that there is a positive relationship between crude oil price and stock markets whereas some found that there is a negative correlation between crude oil price and stock markets (Negi, 2015; Derya, 2017; Alley, 2018). Although many researchers examined the relationship between oil price and stock market, there are only a few researches that examined the impact of oil price change on the Nigerian stock market. The correlation between stock price and oil price is inconlusive and the reason behind this can be the underlying reason behind oil price change (Nwanna, 2016). Hence, the study would like to examine the association between crude oil price and the stock prices.

2. Literature Review

This part discussed the conceptual literature, theoretical literature and empirical literature on the impact of trade openness on economic growth in Nigeria on the two variables that is trade openness and economic growth.

Trade openness has been defined by many economists in different studies and measured in several ways in the various studies that have been conducted in trying to establish the correlation between economic growth and trade openness (Yanikkaya, 2003), trade openness is the liberalization of the exchange of goods and services across borders through increase integration among countries. These countries are joined together in terms of free movement of capital, labour and finance (Igudia, 2004). Trade openness is the ratio of exports plus imports to gross domestic product (Yanikkaya, 2003). Edwards (1993) states that trade openness have become synonymous with free trade that is where the system of trade is free from all trade distortions (protectionists measures) like tariffs, embargo and quotas.

Economic growth is a monetary measure of the market value of all the final goods and services produced in a period of time, often quarterly or annually. Nominal GDP estimates are commonly used to determine the economic performance of the whole country or region and to make international comparisons. It is the most important and one of the primary indicators utilized to measure the condition of any country's economy. The monetary worth of all the services and finished goods produced surrounded by country's borders in a precise time period is called GDP. It is normally measured in annual basis. Although GDP is usually

calculated on annual basis, but it can also be calculated on the quarterly basis. Gross domestic product is the monetary worth of all the services and finished goods produced surrounded by a country's borders in a precise time period and it is normally measured on the annual basis.

Theoretical Review

The connection between trade openness and economic growth has received a great deal of attention both in the theoretical and empirical literature during the last three decades. According to the theory of comparative advantage, if a country wants to trade with another country the latter will produce goods in which it has a comparative advantage. It should specialize in the sector for which it has better factor endowments and produce goods on a larger scale. As a result, productivity and exports of this sector will go up and this will boost the overall economic growth. This theory has been further extended by other economists, Krueger (1978) and Bhagwati (1978) argue that trade liberalization encourages specialization in sectors which have economies of scale that contribute to improve the efficiency and productivity in the long-run. New endogenous growth models explain a positive relationship between trade openness and economic growth as the result of the international diffusion of advanced technologies (Coe & Helpman, 1995; Grossman & Helpman, 1991; Romer, 1994).

A country with a higher degree of openness has a greater ability to use technologies generated in advanced economies, and this capability leads them to grow more rapidly than a country with a lower degree of openness. At the theoretical level, trade openness significantly affected the growth of any economy. Endogenous growth models in the open economies also shows that the mechanic linking trade openness and economic growth is yet an open question in the theoretical literature. Building on this exposition, Romer (1990) and Lucas (1988) developed the "Endogenous Growth Theory" where trade leads to higher growth through dynamic gains. Romer (1990) generally imply in the endogenous growth theories or new growth theories that openness to trade fosters open competition that drives innovation, greater resource allocation, efficiency and technological advancement. The Heckscher-Ohlin Model explained that if there are two resources in two economies (that is one is labour-intensive and the other is capital-intensive) then trade openness can lead to higher productivity, hence higher incomes in both countries. Krugman (1979) replied in his "new" trade theory that the total output increases as a country liberalizes its trade. When an economy opens up, forces of comparative advantage force the economy to specialize in the sector for which it has better factor endowments. As a result, productivity of that sector goes up. The exports from that sector also increase which consequently boosts growth (Romer, 1990). Before the advent of the new trade theories, some of the postulates in international trade theories were as a result of among others, the contributions made by Ricardo, Heckscher, Ohlin and Samuelson. To start with, the Ricardian model of trade considers technological differences as the main factor causing international trade (Krugman, 1987).

In contrast, the Heckscher-Ohlin-Samuelson modelm attributes international trade to differences in factors endowments.The new theories, including the endogenous growth theory, support the view that trade openness has a positive influence on economic growth. For instance, Romer (1990) argues that free international trade tends to speed up economic growth. Within the endogenous growth framework, one of the ways

through which trade openness is believed to affect economic growth is the transmission of technology (Karras, 2003). Thus, technology transfers and other factor movements are more possible in an open economy compared to a closed economy. Drawing on an argument from the endogenous growth theory (Adhikary, 2011) posits that trade openness may affect economic growth by facilitating flows of international capital as well as by redirecting factor endowments to more productive sectors. Apart from facilitating factor movements and capital flows, trade openness can also affect economic growth through its effect on labour productivity and export capability. In this view, an economy that is more open to trade is inclined to have increased specialization and division of labour, thus improving productivity and export capability (Constant & Yaoxing, 2010).

Although many researchers on the other hand argue that it is not possible for a nation to continue to maintain a positive balance of trade indefinitely. They had a view that countries should produce and export commodities with lower cost advantage and the same country should import a commodity in which it has higher absolute cost disadvantage. The argument is that partaking in foreign trade can have a strong positive strength for economic growth (Keho, 2017; Nduka, 2013). Meanwhile, the Heckscher-Ohlin argue that if two countries want to enter into trade with each other, they must have the same technology, constant returns to scale, and a given factor-intensity relationship between final products. The country with better factor endowment should produce goods at a larger scale and trading will boast economic growth (Heckscher, 1919 & Ohlin, 1933).

Empirical Review

Adaromola (2017) examined the long-run and short-run dynamic effects of oil price on stock returns in Nigeria over a period 1985 to 2009 using the Johansen cointegration tests. Findings revealed a significant positive stock return to oil price shock in the short-run and a significant negative stock return to oil price shock in the long run. The Granger causality test shows strong evidence that the causation runs from oil price shock to stock returns implying that variation in the Nigerian stock prices is explained by oil price volatility.

Olamide et al (2017) established the nexus between oil price, exchange rate and stock price index (ASI). Annual times series data covering the period 1985-2014 was used to estimate the model using regression analysis. Results revealed that crude oil prices and exchange rate does impact all share index. The recommendation was that the Government should ensure that oil companies in Nigeria were listed on the Nigerian Stock Exchange market to have direct impact on the economy.

Saucedo (2018) analyzes the variables of oil price, exchange rate and stock market index to explain how they interact with each other in the Mexican economy. The examined period includes monthly data from January 1992 to June 2017. A Vector Autoregressive Model (VAR) is implemented that includes oil prices, the nominal exchange rate, the Mexican stock market index, and the consumer price index. Results revealed that exchange rate has a negative and significant expect on the stock market index. It is also found that the consumer price index has a positive expect on the exchange rate and a negative expect on the stock market index with oil prices been significant against the exchange rate, concluding that an increase in oil prices creates an appreciation of the exchange rate. In addition, the impulse-response functions show that the expects found tend to disappear over time.

Teixeira et al. (2016) used the data of 54 Portuguese companies over the period

1993–2013 to study the effects of oil price over individual Portuguese stock returns and the results revealed that the applicability of oil prices on stock returns, moreover, indicate the significant asymmetric effect of oil prices on individual company stocks.

Chiwanza et al. (2015) selected time period 2009–2012 and highlighted the impact of crude oil price volatility on Zimbabwe stock indices by using GARCH model. They concluded that oil price shocks have been incorporated in Zimbabwe stock indices. The reserves of fuel prevent the economy to be affected, a time of lag from 9 to 30 days, by oil price fluctuations. Additionally, they discovered global oil price benefiting industrial index and adversely affecting mining index of Zimbabwe stock market, hence proved to be positively correlated with industrial index and negatively with mining index.

3. Methodology

This section explained the methodology that would be used to estimate the data in this section. This section would specification of the model, technique of estimation to be use, expected signs of the parameters of estimation, sources of data and sample size and table that show the variables name, notations, and variables measurement.

Model Specification

To empirically analyze the impact of trade openness on economic growth in Nigeria within the period under review. The functional (Mathematical) notation of our model is given below:

Their baseline model was expressed as:

$$STKP_t$$
$$F\ (OP_t, INF_t) \ldots\ldots 3.1$$

$STKP_t$ = Stock Prices (measured by the stock market index)

OP_t = Crude Oil Price

INF_t = Inflation Rate

ln = Natural Logarithm (the model was transformed to reduce skewness, produce nearly equal spreads and a nearly linear and/or additive relationship).

Technique of Estimation

The technique of estimation used in this study would be Autoregressive Distributive Lag (ARDL) developed by Pesaran*et al.* (2001). ARDL is a model containing the lagged value(s) of the dependent variable as explanatory variables. ARDL model used both endogenous and exogenous variables, it can also be used with variables integrated of different orders such as *I*(0) and *I*(1)). The specification of ARDL begins with constructing conditional error correction model as thus:

$$\Delta SP_t = \beta_0 + \sum_{i=1}^{k} \beta_1 \Delta SP_{t-i} + \sum_{i=0}^{k} \beta_2 \Delta OP_{t-i} + \sum_{i=0}^{k} \beta_3 \Delta IF_{t-i} + \sum_{i=0}^{k} \beta_4 \Delta EX_{t-i} - \theta_1 SP + \theta_2 OP + \theta_3 IF + \theta_4 E + \mu_t$$

The error correction term (ECM) is introduced below:

$$ECT_t = SP_{t-I} - \phi_0 - \sum_{i=1}^{k} \gamma_{3i} \Delta SP_{t-i} - \sum_{i=0}^{k} \beta_{3i} \Delta OP_{t-i} - \sum_{i=0}^{k} \alpha_{3i} \Delta IF_{t-i} - \sum_{i=0}^{k} \vartheta_{3i} \Delta EX_{t-i}$$

Where *ECT* is the error correction term and β is the coefficient of the error correction term which measures the speed of adjustment of the variables back to equilibrium in the long-run which must be negative, significance and less than one in absolute term. If the coefficient of the error correction term comes out with positive sign, it would mean that the model is exclusive. The coefficient of the error correction term also shows the percentage of deviation from the equilibrium that needs to be corrected.

ARDL Diagnostic tests

The diagnostic tests will also be applied to test the accuracy of the model which

includes the serial correlation LM test, the heteroscedasticity test, the normality test, the Ramsey Reset test for specification and the stability test.

4. Result and Discussion

Data Analysis and Presentation

Before estimating co-integration test, the research applied two different popular unit root tests, Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) to determine the order of integration of the variables under this study. However, it is worthy to note that any presence of I (2) among the variables may render the methodology invalid. This is because, the methodology has been developed based on the assumption that the variables are either purely I (0), I (1) or mixture of I (1) and I (0). Conducting unit root test is very essential because estimating the result of the specified model without conducting unit root test may lead to obtaining unbiased estimation which would not be reliable for policy recommendation and make appropriate conclusion from the result. But running the results by appropriately determining the best method of estimation from unit root test can lead to obtaining reliable result. Therefore, we conducted the unit root tests to be sure of the variables' order of integration and the results are reported in Table 1 and 2.

Table 1: Unit Root Test Using Augmented Dickey Fuller (ADF) and Phillips Perron (PP)

Variables	ADF Test Statistics			
	Constant		Trend	
	Level	First diff.	Level	First Diff.
LTOP	-2.239 (0.196)	-7.503 (0.000) ***	-2.743 (0.226)	-7.351 (0.000) ***
LOILP	-1.330 (0.606)	-6.151 (0.000) ***	-1.987 (0.590)	-6.039 (0.000) ***
LOFEXR	-2.820 (0.065) *	-4.793 (0.000) ***	-2.771 (0.216)	-4.795 (0.002) ***
LRGDP	-1.508 (0.519)	-4.210 (0.002) ***	-2.113 (0.5226)	-2.548 (0.304)
LLB	-0.600 (0.859)	-4.444 (0.001) ***	-2.421 (0.364)	-4.368 (0.007) ***
LCP	-2.118 (0.239)	-4.674 (0.000) ***	0.021 (1.000)	-5.198 (0.000) ***

Source: Author's Computation by using E-views 10

Table 2: (ADF) and (PP) cont.

PP Test Statistics			
Constant		Trend	
Level	First Diff	Level	First difference
-2.515 (0.120)	-7.620 (0.000) ***	-3.093 (0.121)	-7.683 (0.000) ***
-1.341 (0.601)	-6.171 (0.000) ***	-2.037 (0.564)	-6.031 (0.000) ***
-2.261 (0.189) **	-4.656 (0.000) ***	-2.194 (0.480)	-4.624 (0.003) ***
-0.959 (0.759)	-4.230 (0.002) ***	-3.858 (0.024) **	-3.755 (0.030) **
-0.581 (0.864)	-4.44 (0.001)	-2.163 (0.496)	-4.368 (0.007) ***
-2.064 (0.260)	-4.674 (0.000) ***	-0.311 (0.988)	-5.199 (0.000) ***

Source: Author's Computation by using E-views 10

The results from Table 1 and 2 revealed that Economic Growth, Trade Openness, Oil Price, Exchange Rate, Total Labor Force and Gross Fixed Capital Formation are stationary at first difference. Having mixture of the order of integration that is 1(0) and 1(1), ARDL approach becomes the most appropriate method to apply in this work.

To avoid multicollinearity problem among the explanatory variables, correlation test was conducted and reported in Table 4.2. The results of the correlation matrix indicate that there is no multicollinearity among the explanatory variables. Consequently, the variables can be used in their respective models and can yield reliable result. The problem of multicollinearity has been solved by taking the logarithms of the explanatory variables which is one of the ways of solving multicollinearity problem.

Table 3: Correlation Matrix Results

LRGDP	LOILP	LOFEXR	LLB	LCP
0.421371	-0.143420	-0.015155	0.369123	-0.016500
-0.143412	0.058665	0.005517	0.002152	0.030208
-0.015155	0.005517	0.004788	-0.041487	0.016682
0.369123	0.002152	-0.041487	2.967855	0.030602
-0.016500	0.030208	0.016682	0.030602	0.095113

Source: Author's Computation by using E-views 10

Table 4: Lag Selection Test Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1582.881	NA	8.38e+28	83.62529	83.88386	83.71729
1	-1364.909	355.6372	5.95e+24	74.04786	75.85782*	74.69183*
2	-1325.366	52.03055*	5.72e+24*	73.86137*	77.22274	75.05732
3	-1300.354	25.01182	1.55e+25	74.43970	79.35246	76.18762

Note. *Indicate lag order selected by the criterion

Source: Author's Computation by using E-views 10

From Table 4, the optimum lag selection result indicates that likelihood Ratio (LR), and Final prediction Error (FPE) all indicate lag 2 is preferred for variables estimation. Out of the three information criteria, Final Prediction Error (FPE) has the minimize value.

Table 5: Bounds Test Result

Model	Lag	F-Stats	Significance Level	Critical Bound Test Unrestricted intercept and no trend	
(TOP_tRGDP_t, $OFEXR_t$,,$OILP_t$, LB_t , CP_t)	2	**3.861**		1(0)	1(1)
			1%	3.060	4.150
			5%s	**2.390**	**3.380**
			10%	2.080	3.000

Source: Author's Computation by using E-views 10

Critical values are obtained from Narayan Table case III, Narayan (2005). The boldness indicates the level of significance at which the F-statistic exceeds the upper bound.

The results reported in Table 5, indicates that the computed F-statistics of **3.861**is greater than the upper bound value that is **3.380**at 5% significance level based on the computational result. This shows presence of long-run relationship among our variables; this indicates rejection of null hypothesis of no co-integration exists and acceptance of the alternative hypothesis that long-run relationship exist that is existence of co-integration among the variables of interest.

Table 6: Long-Run ARDL Result
Estimated Long-Run ARDL Result
Dependent Variable, TOP

Regressors	Coefficients	T-statistics (p-value)
OP	0.015	-3.581 (0.001) ***
EX	-0.002	-0.206 (0.838) *
IF	-0.002	-0.377 (0.709) *
Constant	0.075	0.340 (0.736) *

Source: Author's Computation by using E-views 10

The long-run result shown in Table 4 indicates that oil price has significant positive impact on stock prices. The significant positive impact of oil price on stock prices means that in the long-run, rise in the oil price leads to increase in the value of stock prices. However, exchange rate and inflation rate have insignificant negative impact on the stock price in the long run when the impact of other independent variable is held constant.

The error correction term (which represent long run component) depicts approximately 71% speed of adjustment to the long-run equilibrium that is it shows 71% percentage of deviation from the equilibrium that is needed to be corrected each year. Being negative, less than one in absolute value and significant, the coefficient of the error term confirms the cointegration relationship among the variables.

Table 7: Estimated Long-Run ARDL Result
Dependent Variable, TOP

Regressors	Coefficients	T-statistics (p-value)
LOILP	0.660	3.295 (0.003)***
LRGDP	-0.965	-5.234 (0.000) ***
LOFEXR	-0.142	-1.580 (0.125)
LLB	1.098	2.526 (0.017) ***
LCP	-0.109	-0.477 (0.637)
Constant	-10.530	-1.298 (0.204)

Source: Author's Computation by using E-views 10

The long-run results presented in Table 7 indicate that oil price and total labor force have significant positive impact on trade openness even in the long-run. It means that in the long-run, rise in the value of oil price and total labor force lead to increase in trade openness. Contrary, economic growth has significant negative impact on trade openness in the long-run, indicating that an increase in the value of economic growth by a unit result to decease in the value of trade openness in the long-run. However, official exchange rate and gross fixed capital formation have insignificant negative impact on the trade openness in the long run if the influence of other independent variables is held constant.

Oil price has shown positive impact on trade openness in both short run and long run in the model. As such, different policies should be considered by the policy makers when it comes making decision about increasing or decreasing oil prices because increasing prices of oil determine the degree of open-up than when oil prices decreased.

Table 8: Diagnostic Tests Results

Test Statistics	LM Version	F Version
A. Serial Correlation	CHSQ(2) =0.180 (0.914)	F(2,18) = 2,28 (0.937)
B. Functional form	t-statistic =1.353 (0.187)	F(1, 29) = 1.830 (0.187)
C. Normality	CHSQ(1) =1.421 (0.018)	Not applicable
D. Heteroscedasticity	CHSQ(8) =6.615 (0.579)	F(8,30) =0.766 (0.635)
DW-statistics	(0.66)	Not applicable

Source: Author's Computation by using E-views 10

A: Lang range multiplier test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values.

Ensuring the reliability and efficiency of the estimates, the study conducted some diagnostic tests and reported the results in Table 9. The results revealed that the model passed all the diagnostic tests conducted as we failed to reject their null hypotheses.

Furthermore, as recommended by Pesaran and Pesaran (2003), the study employed the cusum and cusum SQ tests for stability of the model along the sampled periods.

5. Conclusion and Recommendations

Conclusion

This study examined the impact of trade openness on the economic growth in Nigeria by using ARDL framework covering the total period of 1980-2020 in this research. Unit test was conducted using two popular unit root tests that is Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) to determine the order of integration of the variables used in this research. The stationary test shows that Trade Openness, Oil Price, Exchange Rate, Total Labor Force and Gross Fixed Capital Formation are all stationary at first difference while Economic Growth is stationary at level given the 5% significance level. The cointegration test was conducted after the optimum lag was determined on the basis of Akaike Information Criterion. The cointegration test indicated that the variables have long-run equilibrium relationship.

Recommendations

The major policy implications coming from this study can be presented as follows. The short run positive relationship between trade openness and economic growth found in this study implies that Nigeria should ensure that the policies are initiated and implemented with needed speed if they need to partake in the gains that are in trade openness and willing to stimulate the economic levels performance. Nigeria should ensure that it aligns its exports and imports components with appropriate policies that would reduce importation of consumer goods and other technologies. This would ensure that the Nigerian economic growth is stimulated by trade openness. Based on the overall results of this study, it is evident that international trade plays a significant role in Nigerian economic growth. The implication is that in order for Nigeria to benefit more from international trade, it must continue with the policies that enhance increased trade openness in the country. Similarly, the positive and significant influence of oil price fluctuation on trade openness in both

short-run and long-run implies that oil price fluctuation contributes positively to the progress of trade openness in Nigeria. This means that an increase in oil price fluctuation results to an increase in trade openness. The major policy recommendations that emerge from the study in a bid to relieve the economy from inherent problems, the following solutions are recommended:

Oil price fluctuation may be regarded as essential determinant in the analysis of macroeconomic fluctuations in Nigeria. Therefore, there is need to diversify the productive base of the economy to other sectors such as Agriculture, Manufacturing, Tourism and other service-oriented sectors to open up a wider spectrum for inflow of income to the economy and break the overdependence of the economy on oil sector. Increase in government credible spending on capital project to encourage the productivity of the non-oil sector. Finally, there is the need to encourage laudable indigenous industrialist to invest in order to produce modern sophisticated finished goods that have positive price.

Nigerian government should encourage policies that increase the participation of importing and exporting of goods. This would foster trade openness which is known to positively contribute to economic growth in Nigeria.Nigeria should put in place policies that would make its economy attractive to foreign investors.

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